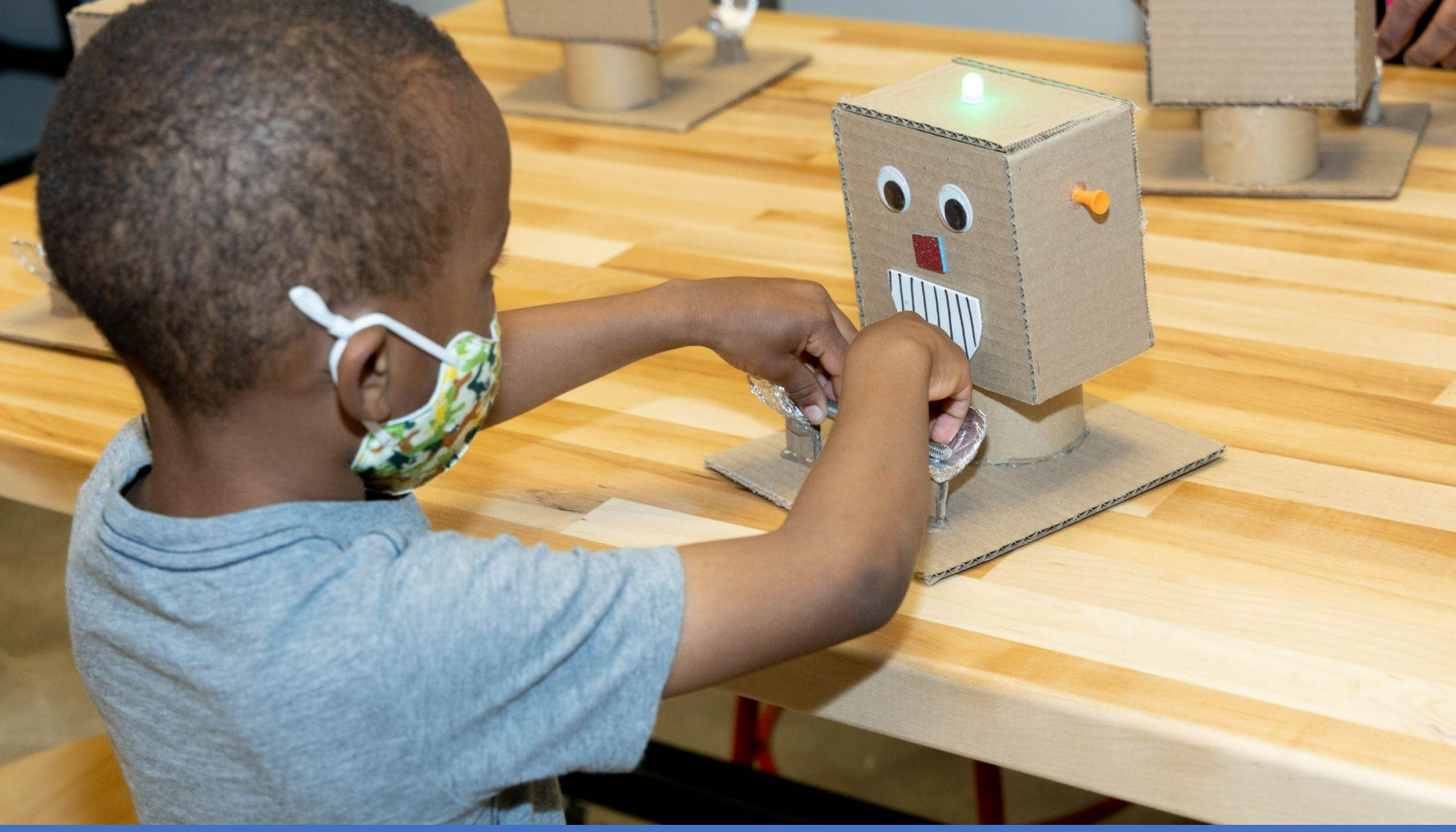
KID + MCPS Partnership: Our Data & Impact



"We have to start STEM exposure earlier, before middle school. And what they do at KID Museum has to exist in the classroom too."

— Dr. Monifa McKnight, Superintendent, MCPS, Community Conversation (May 2022)

Students create unique projects using novel tools and materials that thoughtfully support literacy and math standards at their grade level. The curriculum development devoted to this program including dedication to prototyping and reflection make it stellar for students!

— MCPS Teacher participating in *KID Afterschool*

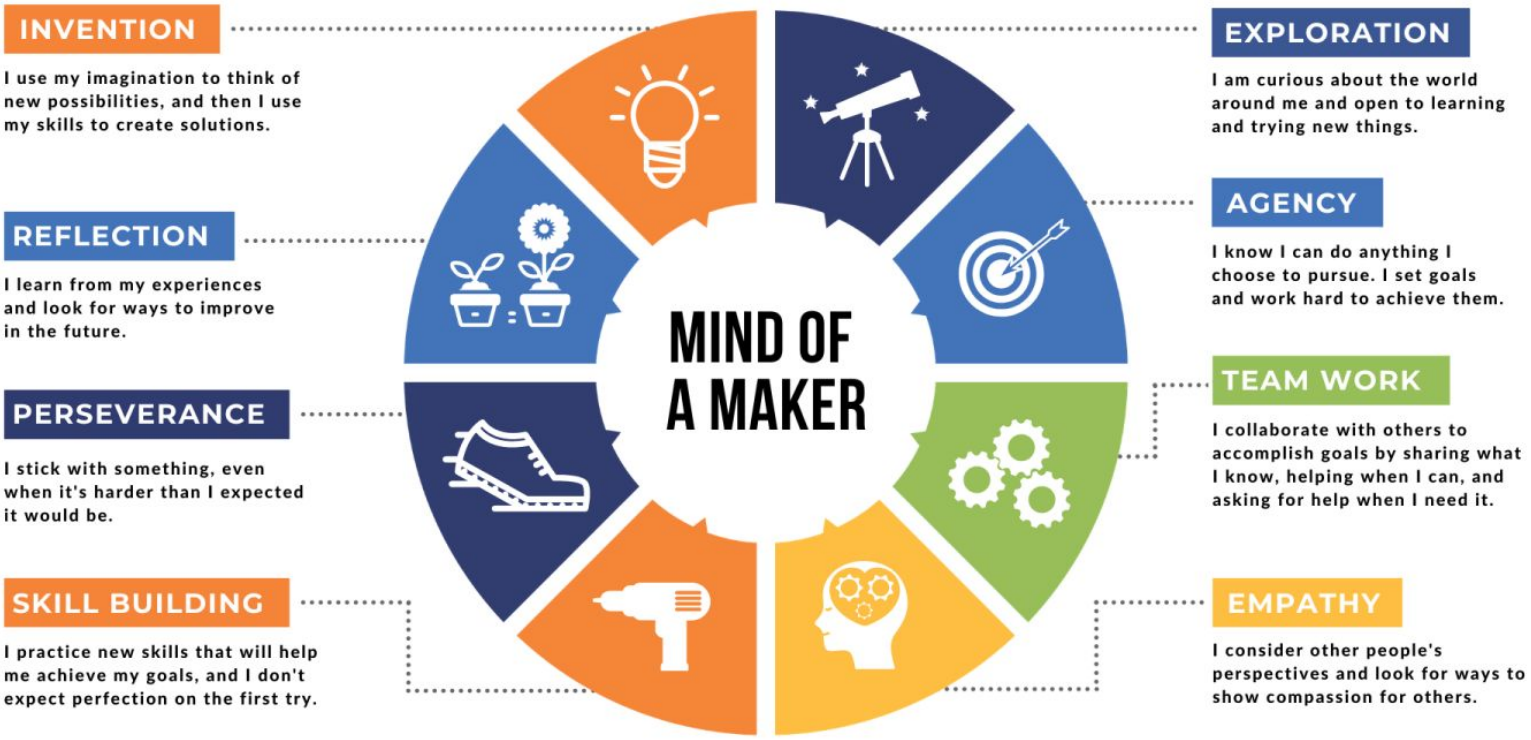
Why Maker Learning?

KID Museum programs help students develop the “mind of maker” and build critical skills for the future. Students are activated as “makers” who build agency, confidence, and creative problem-solving abilities, while developing skills in design, engineering, coding, and 3D modeling.

Students become motivated learners with technical and social emotional skills, as they pursue self-directed projects based on their own interests. Our maker educators empower rather than instruct, while students actively engage with math and science concepts in order to invent.

KID Museum programs:

- Provide **dynamic, hands-on** learning experiences
- Leverage **STEM-rich**, maker learning experiences **aligned to NGSS**
- Encourage **exploration and iteration** through open-ended design challenges
- Promote **collaboration, interaction, and agency** in students



Our Shared History

In 2014, KID Museum's *Invention Studio* was piloted at Parkland Middle School. The goal of the program was to support students who were struggling academically and to narrow the achievement gap of the Latinx and African-American student population.

In 2016, the program was expanded to include 7 middle schools, and the impact on student outcomes increased dramatically, further validating the KID model.

Invention Studio Outcomes

93% increased **interest in STEM**

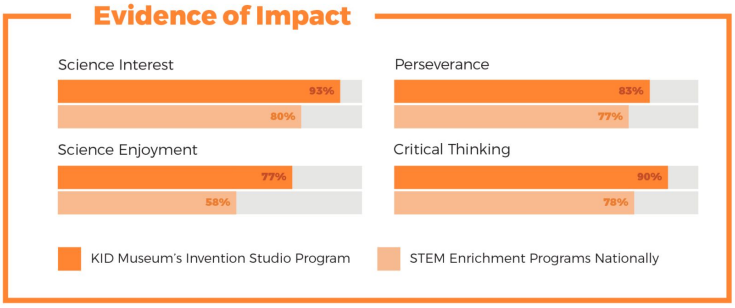
80% increased **interest in a science career**

77% increased **enjoyment in STEM**

90% increased **critical thinking skills**

94% increased **quality of relationships with peers**

83% increased **perseverance in their work**



Given the success of the KID model, in 2017, KID Museum partnered with MCPS to establish a districtwide, equity-focused STEM initiative at the middle school level. The ***Invent the Future*** program continues to broaden student access to hands-on, project-based learning experiences that promote technical problem-solving and social-emotional skills critical to succeed in a fast-changing, 21st century economy.

In collaboration with MCPS, we use a consistent set of criteria to identify schools for participation, prioritizing:

- High FARMs Rate Schools
- Teacher & Administrator Champions
- Geographic Diversity

Our Shared Vision

Since 2014, KID Museum and MCPS have partnered to leverage ***maker learning*** as an equity-focused strategy to **accelerate STEM skill-building** and **social-emotional learning**. Our goal is to create a continuum of K-12 maker learning experiences for all MCPS students, prioritizing underrepresented populations.

KID Museum's unique approach to learning centers on **creative problem-solving** and supporting youth to develop **agency and confidence as learners.**

KID Museum is a trusted **innovation partner**, providing:

- Deep learning experiences for students with a focus on equity and inclusion
- Curriculum development & teacher PD
- A platform for family & community engagement
- A bridge to industry and career exposure
- A model for other communities nationally

Evaluation of Impact

Across all of our programs, we gather sociodemographic data *(provided by the MCPS Office of Shared Accountability)*

- **School**
- **Class/Club**
- **Gender**
- **Race/Ethnicity**
- **Services Received** (FARMS, EML, Special Education)

In addition to the meaningful data gathered in partnership with the **MCPS Office of Shared Accountability**, KID Museum collaborates with two independent evaluation groups, **The PEAR Institute** and **Sharp Insight, LLC**, to measure the impact of these programs. The tools leverage student self-reporting, retrospective change analysis, and teacher impressions of student outcomes.

Outcome Measures

In **students**, we are measuring:

- **STEM Attitudes:** Curiosity, Engagement, Career Interest, Identity, Perseverance, and Enjoyment in STEM
- **Social Emotional Skills:** Self regulation, Empathy, Relationships with Peers & Adults, Resilience, Reflection
- **Learning & School Engagement:** Learning Interest, Critical Thinking, Motivation
- **Acquisition of Literacy, Math, and Engineering Skills** aligned with key academic standards

In **educators**, we are measuring:

- **Educators' Confidence and Identity in STEM:** Confidence, interest, and ability to lead STEM activities

Our SY21-22 MCPS Programs

6,334	365	54
STUDENTS	TEACHERS	SCHOOLS

- 69% of students received FARMS
- 54% Hispanic/Latino students
- 30% Black/African American students
- All students participate in programs with 14+ hours of facilitated content

Data shared by the MCPS Office of Shared Accountability

Invention Programs

At present, KID Museum's Invention Programs are offered at both the **elementary and middle school** level, creating **a powerful learning continuum**.

Our programs **integrate STEM, design, and social responsibility,** along with **social-emotional learning.** They engage students in a sequenced maker-based curriculum including 4 hands-on field trips to KID Museum, in-class curriculum delivered by teachers (between 6 - 60 hours, depending on the program), teacher professional development, and community showcases.

Across multiple hands-on sessions, students are guided through the invention process — **designing, developing, prototyping, and troubleshooting their ideas.** As students build inventions to solve community and environmental problems, they build skills in **literacy, engineering, electronics, 3D modeling, computational thinking, and coding.** Additionally, throughout this process, **students learn how to innovate, solve problems, gain confidence, develop a deeper sense of empathy, and collaborate with others** — skills important for their future success.

KID Museum collaborates with **two independent evaluation groups**, The **PEAR Institute** and **Sharp Insight, LLC**, to measure the impact of these programs. These **evaluation tools leverage student self-reporting, retrospective change analysis, and teacher impressions of student outcomes.**

ELEMENTARY

- KID Inventors
- KID Afterschool
- Summer ELO

MIDDLE

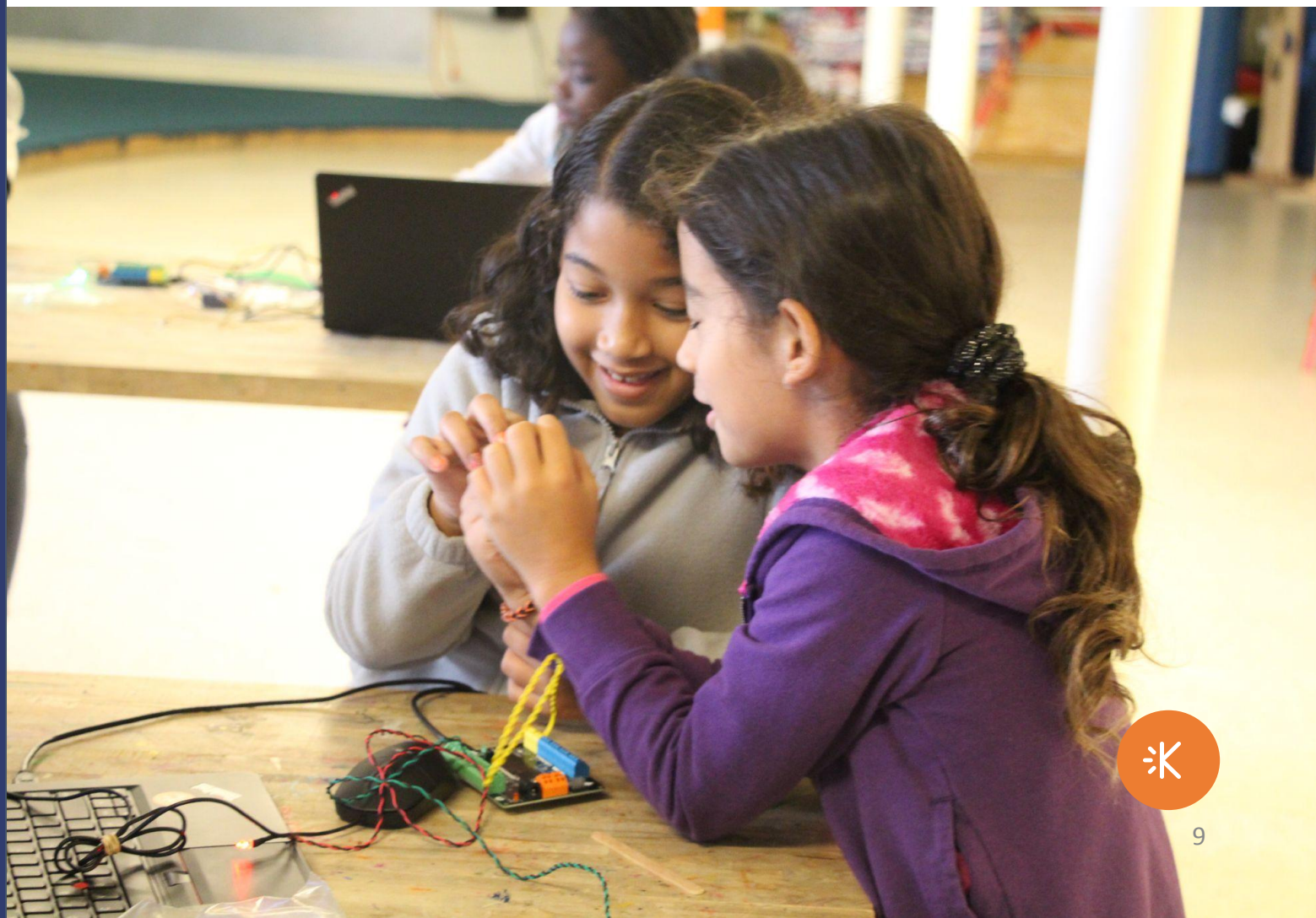
- Invent the Future
- *Intro to Inventing* Summer Course

KID Inventors

KID Inventors is a **comprehensive, multi-visit student program for Grades 2-4, including field trips to KID Museum, in-class curriculum, and teacher professional development support.**

This program is **aligned with** both **Next Generation Science Standards** (NGSS) **and key Common Core State Standards** (CCSS) in math, and can be integrated into a science class, STEM elective, or enrichment setting for elementary students.

KID Museum's unique model leverages maker learning, which integrates STEM and project-based learning with creative problem-solving and social-emotional learning. Students build **skills** related to **scientific inquiry, computational thinking, engineering design, coding, and technology.** Most importantly, they **develop agency and confidence as learners**.



KID INVENTORS PROGRAM 2021-2022 IMPACT

During the 2021-2022 school year,

1,079

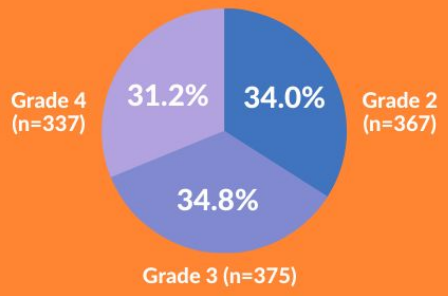
grade 2-4 students from four **Title I Elementary Schools** participated in the KID Inventors program during class.

Each child received

15.5

hours of hands-on learning in the **KID Inventors Elementary Program.**

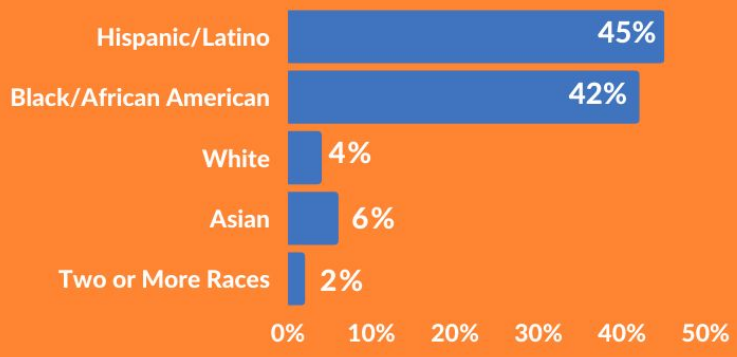
GRADE LEVEL



GENDER

50% Female 50% Male

RACE/ETHNICITY



SERVICES RECEIVED

70% Free & Reduced-Priced Meals (FARMS)

40% Emerging Multilingual Learners (EML)

9% Special Education

Based on data from Data Brief "2021-2022 Data Summary of Selected KID Museum Programs at Montgomery County Public Schools" from the Montgomery County Public Schools Office of Shared Responsibility, Applied Research and Evaluation

MCPS

KID MUSEUM

Program Measures

In 2021-2022, KID Museum evaluated the *KID Inventors* program with qualitative feedback surveys. KID staff designed tailored, age-specific, survey measures, delivered to students at the end of the program, to measure:

- The novelty of the STEM experience to the student
- The ability of the student to successfully generate solutions to a problem in the context of the program
- Student persistence within the program
- Student inventiveness within the program
- Student joy in learning STEM concepts within the program
- Student STEM/maker identity

Program Outcomes

Of **631** students surveyed

93% **had a novel STEM experience** at KID

74% experienced **success in generating a solution to a problem**

90% **exhibited persistence** at KID

77% **were inventive** during their experience

93% **experienced joy in learning STEM** concepts

87% **identified as a maker**

KID Afterschool

KID Afterschool is a high-impact, extended learning program **aligned with key academic standards and social-emotional learning goals.** Originally funded by the Children's Opportunity Fund, and designed to support recovery from Covid learning loss, the program serves MCPS elementary students in grades K-3, providing opportunities for deep engagement with students and their families.

KID Afterschool employs a **teacher professional development** model. MCPS educators are provided with the **curriculum and training** to confidently deliver meaningful STEM education afterschool through making.

Students develop **math, literacy, critical thinking, and social emotional skills** during hands-on maker experiences, and through these experiences, become more interested and engaged in math, reading, and STEM inside and outside of the classroom.

KID AFTERSCHOOL PROGRAM 2021-2022 IMPACT

During the 2021-2022 school year,

138

Grade K-3 students from four MCPS elementary schools participated in the KID Afterschool program

Each student received at least

15.5

Hours of hands-on learning in KID Afterschool

48

Hours of curriculum were **delivered** over the full school year

MCPS

KID MUSEUM

Program Measures

In 2021-2022, KID Museum evaluated the *KID Afterchool* program using a evaluation plan developed by KID Museum and Sharp Insight, LLC.. Evaluation methods and data sources used for KID Afterschool evaluation included a combination of: student attendance logs, program monitoring forms, program observations at each site, interviews with leadership and staff, and surveys of students, parents/family members, and staff. The program evaluation questions focused on the strengths, challenges, and opportunities in the KID Afterschool model with respect to:

- Youth engagement in programming
- Youth satisfaction with programming
- Youth attainment of program outcomes (e.g. social and emotional learning, STEM interest and engagement)
- Alignment with high-quality program standards
- Staff recruitment, training, and capacity
- Implementation of the program model as designed

Program Outcomes

Of **103** students surveyed

93% are **more excited to try new things**

82% are more **excited to solve problems**

81% are more **excited to come to school**

97% reported **"my teachers care about me"**

94% reported **"I feel like I belong"**

90% reported **"my ideas matter"**

... because of KID Afterschool

Of **21** adult family members surveyed

100% reported that their child demonstrated **an increased interest in taking educational risks**

100% reported that their child demonstrated **an increased interest in solving problems**

95% reported that their child demonstrated an **increased interest in attending school**

Invent the Future

Our longest running MCPS partnership, *Invent the Future* is a **maker-learning experience open to all MCPS middle school students**, challenging them to answer the question, **"What will you make to improve life on this planet?"**

Through the process of designing their own inventions in either a semester long in-school course, class, or afterschool club, students learn to **innovate, solve problems, gain confidence, engender compassion, and work with others** — all skills for future success.

The *Invent the Future* Challenge supports development of **innovative thinking, technical and social emotional skills, and an interest in STEM** — inspiring and supporting educators along the way with curriculum and skill building workshops.

The Challenge culminates with a Summit, where students are able to showcase their innovations, gaining valuable experience and confidence in their presentation skills.

"I feel like every student should have this opportunity. We didn't expect it to have such a huge impact on our lives!"

— Racheal, 7th Grader, Invent the Future participant

Program Measures

In collaboration with the Partnerships in Education And Resilience (PEAR) Institute at Harvard Medical School & McLean Hospital, KID Museum carefully chose particular scales on their Common Instrument Suite (CIS) survey to measure a range of outcomes:

- Student interest and engagement towards STEM after participating in Invent the Future
- Student enjoyment of science, science career interest, science career knowledge, and engagement with science activities outside of school
- Student social-emotional learning /21st century (e.g. critical thinking, perseverance, relationships with adults, relationships with peers)
- Student STEM identity (recognition) and how able they feel they can do science (capability)
- Educator perceptions about their own STEM identities.
- Educator confidence and capability in leading STEM activities
- Educator perception of student STEM confidence, STEM skills and social-emotional skills.

INVENT THE FUTURE 2021-2022 IMPACT

During the 2021-2022 school year,

1,450

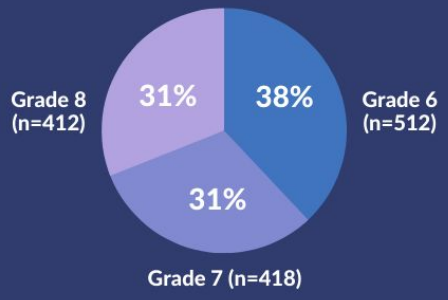
MCPS students from middle schools participated in the Invent the Future Challenge

In the semester-long in-school course experience, each student received at least

55

hours of hands-on learning

GRADE LEVEL

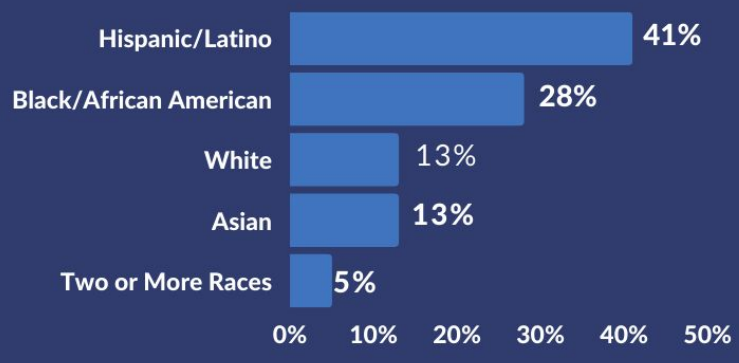


GENDER

38% Female

62% Male

RACE/ETHNICITY



SERVICES RECEIVED

52% Free & Reduced-Priced Meals (FARMS)

14% Emerging Multilingual Learners (EML)

8% Special Education

Based on data from Data Brief "2021-2022 Data Summary of Selected KID Museum Programs at Montgomery County Public Schools" from the Montgomery County Public Schools Office of Shared Responsibility, Applied Research and Evaluation

MCPS

KID MUSEUM

Program Outcomes

Of **110** students surveyed

73% showed an **increase in critical thinking**

75% showed an **increase in STEM engagement**

74% are more **interested in pursuing a STEM job in the future**

62% Are more **curious about science**

75% are more **curious about technology**

68% Are more **curious about engineering**

Of **5** educators surveyed

100% Reported an increase in their students' engineering and technology skills

100% Reported an increase in their students' confidence in engineering & technology

100% Reported an increase in their students' critical thinking skills

75% Reported an increase in their students' perseverance

Summer Extended Learning

Make It Classroom (Elementary School level) and ***Intro to Inventing!*** (Middle School level) are **five week summer programs** developed by KID Museum and designed to introduce students to STEM and 21st century skills by activating them as "makers," who build agency, confidence, and creative problem-solving, while developing skills in engineering and design. Each five week program serves as a cohesive introduction to what it means to be a "maker," emphasizing the fundamental mindset, skills, and strategies used in making.

Make It Classroom is a total of 25 lessons per grade level, each approximately 50-60 minutes in length. The curriculum is aligned to key math and science standards and NGSS Science and Engineering practices, with particular emphasis on omitted or condensed content in the 2019-2020 school year. Intro to Inventing! is designed to be delivered in person. Each lesson is approximately 50 minutes in length, and the curriculum is aligned to key AASL and NGSS standards.

The **goals** of the programs are to: Activate students as "makers" and **build sustained engagement through dynamic STEM, maker-based learning**; provide opportunity for **students to engage in key AASL and NGSS standards through problem solving, critical thinking skills, and invention**; create space for **joyful exploration in summer learning**.

SUMMER EXTENDED LEARNING 2021-2022 IMPACT

During Summer 2021,

2,942 MCPS Elementary

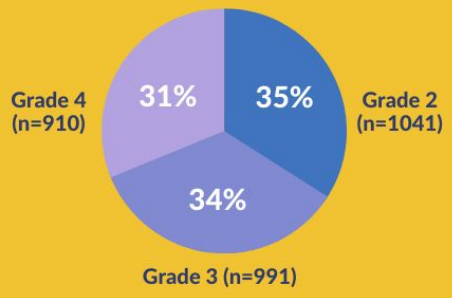
&

55 MCPS Middle School students engaged in KID Summer ELO programs

Each student received at least

25 hours of hands-on learning in the **KID Summer ELO Programs**

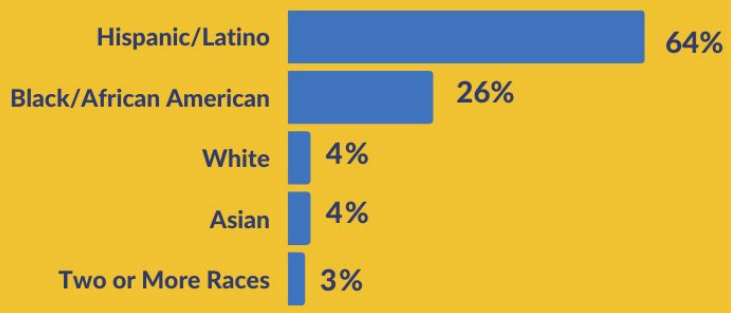
GRADE LEVEL



GENDER

46% Female 54% Male

RACE/ETHNICITY



SERVICES RECEIVED

78% Free & Reduced-Priced Meals (FARMS)

54% Emerging Multilingual Learners (EML)

14% Special Education

Based on data from Data Brief "2021-2022 Data Summary of Selected KID Museum Programs at Montgomery County Public Schools" from the Montgomery County Public Schools Office of Shared Responsibility, Applied Research and Evaluation

MCPS

KID MUSEUM

Teacher Professional Development

KID Museum's **Maker Learning Professional Development Program** was created to **fuel a passion for hands-on, project-based learning, while building teacher capacity** for delivering it.

Grounded in KID Museum's "Mind of a Maker" framework, the program includes **professional development sessions, individualized coaching, and a series of hands-on maker learning experiences that are aligned to district curricula**. Teachers also have the opportunity to share best practices for maker learning in a virtual setting with fellow instructors and become a part of a network of teacher champions, both within their schools and across the region.

In Spring 2021, with the support of Amazon, KID Museum launched a Maker Learning Professional Development Pilot to develop a district-level approach to adopting maker learning across school systems. The result of the program is a model for collaboration between school systems, administrators, teachers, and industry partners to create an ecosystem that supports long-term change in how we teach students STEM and CS skills.

Maker Learning Program Pilot Overview

In partnership with Montgomery County Public Schools and District of Columbia Public Schools, this pilot program reached **10 schools** across the two districts, with **55 teachers** delivering high-impact, maker-based learning curriculum to over **2,000 elementary and middle school students**. Eight of the schools have Title 1 status and serve predominantly low income families and students of color. Participants included principals, assistant principals, classroom teachers, media specialists, STEM teachers, and staff development teachers.

It was awesome, and really changed the way I think about teaching.

— Participating Teacher in KID Museum's Maker Learning PD Pilot

Program Measures

KID Museum, MCPS, and DCPS evaluated the program with a combination of research-validated survey instruments, qualitative feedback surveys, and in-depth teacher interviews.

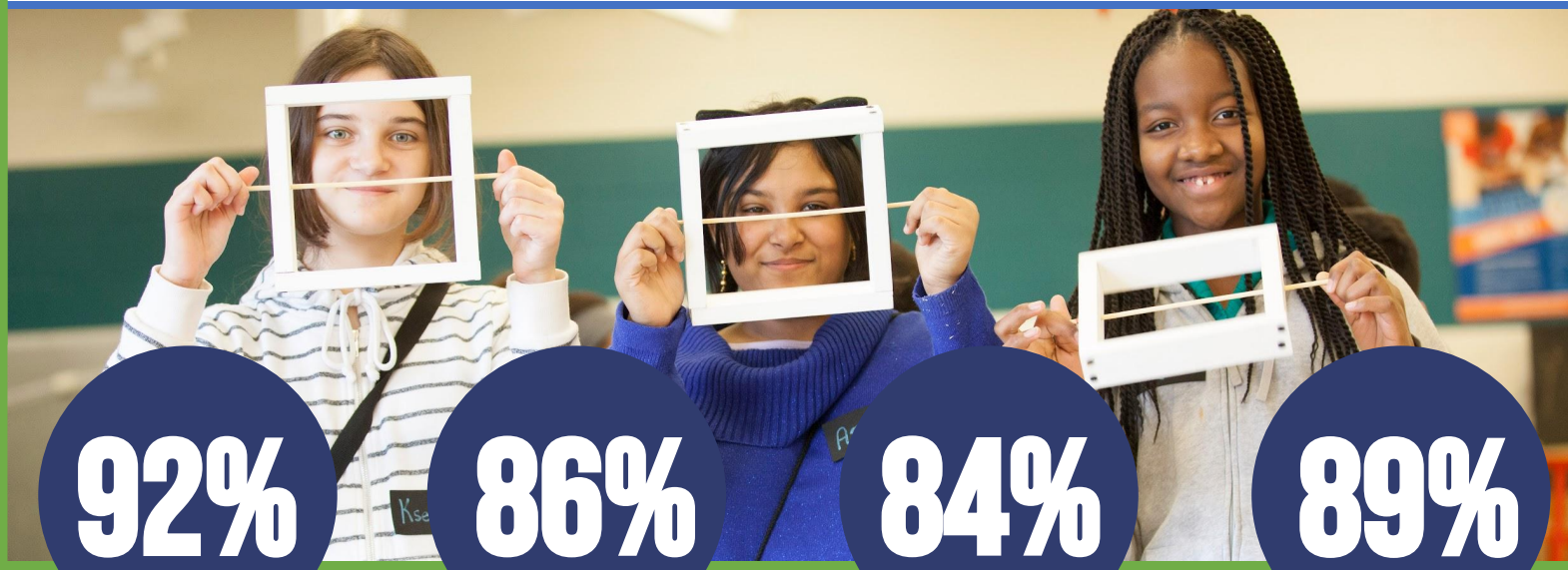
1. Common Instrument Suite - Educator (CIS-E), The PEAR Institute (Partnerships in Education and Resilience)
    - PEAR's Common Instrument Suite - Educator is a self-report questionnaire that measures STEM-related attitudes and educators' perceptions of their students' change in STEM engagement, perseverance, critical thinking, and STEM/CS skills.
2. Qualitative Feedback Surveys
    - KID Museum designed brief feedback forms, including Likert-scales and open-ended questions, which were delivered to participants following each professional development workshop.
3. Teacher Interviews
    - The KID Museum team conducted in-depth interviews with six participating teachers and focused on their experience through the program, impact of the program on their students and school communities, and feedback for future implementation.

Program Outcomes

55
Educators from MCPS & DCPS

2,000
Students

88%
Title I Schools



92%
of teachers said their students improved **engineering skills**

86%
of teachers said their students improved **technology skills**

84%
of teachers said their students improved **critical thinking skills**

89%
of teachers said their students improved **perseverance**

It was awesome, and really changed the way I think about teaching.

— Participating Teacher in KID Museum's Maker Learning PD Pilot

Family and Community Engagement

Across all of our programs, we create opportunities for additional family and community engagement.

KID Inventors: Each participating school hosts a family/school community showcase where students can demonstrate their invention creation process.

Invent the Future: Two large scale events will be held on **January 21** and **June 3** at the Universities at Shady Grove (USG). Community members, corporate/industry mentors, families and stakeholders are invited to engage with student teams and celebrate award winners.

KID Afterschool: A custom-designed Spanish/English website offers families opportunities to extend maker and STEM learning using everyday materials in home-based family activities and projects.

MCPS Family Days: Beginning in January 2023, we will host family days for 2-3 schools on Sundays for a day of maker learning to deepen engagement and sense of belonging.

Our SY22-23 Impact to Date

7,500+	400	60
STUDENTS	TEACHERS	SCHOOLS

The majority of students experience 25+ hours of maker learning

- 5,000 students served during the school day, taking 4 field trips to KID Museum in addition to in-class curriculum and instruction
- 6 MCPS middle schools are implementing a semester-long course

SY22-23 Program and Evaluation Timeline

Jul 2022	• Train Summer ELO teachers • Deliver Summer programs
Aug 2022	• Host Teacher Training
Dec 2022	• Host Teacher Training for *KID Inventors*
Sep - Jan 2023	• Recruitment for *KID Inventors* and *KID After-School*
Sep 2022 - May 2023	• Implementation of *Invent the Future* program and PEAR Assessment
Jan 2023	• Pre-Assessment: *KID After-School* and *KID Inventors* (teachers and students) • Train *KID After Schoo*l teachers and begin program delivery • *Invent the Future* Summit (first of two showcases)

Jan 2023 - Jun 2023	• Program Implementation:
	  ○ Deliver 2nd-4th grade *KID Inventors* program, including field trips to KID Museum
	  ○ Deliver middle school *Invent the Future* program, including field trips to KID Museum
	  ○ Deliver *Maker Studio* PD program (February - May)
	  ○ Deliver *KID After School* program
	• Continue field trips and student programs, including *Family Sundays*
	• Additional PD touchpoints for teachers

Mar-May 2023	• In program assessment (site visits, interviews, surveys) of *KID After-School*
May 2023	• End of semester post-assessments of programs • School Showcases and culminating Events for all programs (including final *Invent the Future* Summit)

Our Strategic Priorities

Continuum of Learning Establish a continuum of maker learning experiences for K-12 students that support sustained engagement and impact.

Teacher PD Develop and support a cohort of teacher champions who serve as active partners in delivering maker learning experiences at scale in MCPS.

Access Prioritize access for students from high-poverty schools, with a mix of experiences embedded in the school day and in out-of-school time experiences.

Family Engagement Integrate family engagement experiences that complement in-school and out-of-school-time programs and deepen sense of identity and belonging.

College/Career Connections Incorporate contextualized exposure to college and career pathways across programs.

Evaluation Collaborate to demonstrate impact on student outcomes and teacher capacity.

Special Thanks

KID Museum extends gratitude to all the individuals who contribute to the success of the MCPS partnership. The district leaders, principals, and educators are passionate about reimagining STEM education for their students, and it is a privilege to collaborate. **Thank you!**

MCPS Leadership

Dr. Monifa McKnight
Superintendent

Niki Hazel
Associate Superintendent

Nichelle Owens
Director, Division of Title I and Early Childhood Programs and Services

Rebecca Dougherty
Supervisor, Division of Title I and Early Childhood Programs and Services

Irina LaGrange
Director, College and Career Readiness, and Districtwide Programs

Shawn Krasa
Supervisor, Department of College and Career Readiness and Districtwide Programs

Kelly Dunston
Coordinator, Department of College and Career Readiness and Districtwide Programs

Andrea Christman
Supervisor, School Library Media Programs

Our Schools

Arcola Elementary School
Ashburton Elementary School
Beall Elementary School
Bel Pre Elementary School
Brookhaven Elementary School
Brown Station Elementary School
Burnt Mills Elementary School
Capt. James Daly Elementary School
Cedar Grove Elementary School
Chevy Chase Elementary School
Clopper Mill Elementary School
Cresthaven Elementary School
Diamond Elementary School
Fields Road Elementary School
Garrett Park Elementary School
Georgian Forest Elementary School
Greencastle Elementary School
Harmony Hills Elementary School
JoAnn Leleck Elementary School
Kemp Mill Elementary School
Rock Creek Forest Elementary School
Rolling Terrace Elementary School
Roscoe Nix Elementary School
Sally K. Ride Elementary School
Sargent Shriver Elementary School
South Lake Elementary School
Strathmore Elementary School
Strawberry Knoll Elementary School
Twinbrook Elementary School
Watkins Mill Elementary School
Weller Road Elementary School
Wheaton Woods Elementary School

Argyle Middle School
Banneker Middle School
Briggs Chaney Middle School
Clemente Middle School
Farquhar Middle School
Gaithersburg Middle School
Hoover Middle School
Julius West Middle School
Key Middle School
MLK Middle School
Montgomery Village Middle School
Neelsville Middle School
North Bethesda Middle School
Parkland Middle School
Rosa Parks Middle School
Shady Grove Middle School
Silver Spring International Middle School
Sligo Creek Middle School
Takoma Park Middle School
White Oak Middle School

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About KID Museum

KID Museum is the region's pioneering experiential museum and educational makerspace. We empower the next generation with the skills to invent the future. Through hands-on programming for kids and youth (ages 4-14), we challenge young people to be active makers, not just passive observers.

We design and deliver programs across the full continuum of learning for kids in pre-K through middle school, in partnership with educators and schools. Our weekend onsite programs, community events, and live, virtual sessions encourage families to learn and explore together.

To learn more, please visit: www.kid-museum.org

KID MUSEUM